REMARKS

1. Claims 1-120 are pending.

The applicant hereby cancels claims 2, 12, 22, 32, 42, 52, 62, 72, 82, 92, 102, 112.

The applicant hereby amends claims 1, 3-11, 13-21, 23-31, 33-41, 43-51, 53-61, 63-71, 73-81, 83-91, 93-101, 103-111 and 113-120. All amendments are supported by the originally-filed application including, but not limited to, the written description from page 26, line 19 to page 26, line 7; page 28, lines 1-27; from page 29, line 22 to page 30, line 11; from page 31, line 5 to page 32, line 2; from page 32, line 27 to page 33, line 16; and from page 34, line 13 to page 35, line 13.

2. The applicant hereby presents twelve (12) new claims 121-132. These claims are supported by the originally-filed application including, but not limited to, the three (3) drawing views respectively designated FIGS. 25, 37 and 49, together with the portions of the written description corresponding thereto. This is explained below.

As to the new claims 121 and 127, these claims are supported by FIG. 25. Referring now to FIG. 25 and, in particular, to the beam array 613 and the coupling beam 614 depicted therein, the coupling beam 614 is clearly depicted as intersecting only a portion of the beam segment 622 in each beam of the corresponding plurality of beams 610a, 610b, 610c which comprise the beam array 613.

As to the new claims 122 and 128, these claims are supported by FIG. 25 and also by the written description at page 29, lines 8-9 and 13-14.

As to the new claims 123 and 129, these claims are supported by FIG. 37. Referring now to FIG. 37 and, in particular, to the beam array 813 and the coupling beam 814 depicted therein, the coupling beam 814 is clearly depicted as intersecting only a portion of the beam segment 822 in each beam of the corresponding plurality of beams 810a, 810b, 810c which comprise the beam array 813.

As to the new claims 124 and 130, these claims are supported by FIG. 37 and also by the written description at page 32, lines 13-14 and 18-19.

As to the new claims 125 and 131, these claims are supported by FIG. 49. Referring now to FIG. 49 and, in particular, to the beam array 1009 and the coupling beam 1005 depicted therein, the coupling beam 1005 is clearly depicted as intersecting only a portion of the beam segment 1022 in each beam of the corresponding plurality of beams 1010a, 1010b, 1010c which comprise the beam array 1009.

As to the new claims 126 and 132, these claims are supported by FIG. 49 and also by the written description at page 35, lines 29-31 and page 36, lines 4-5.

3. The remarks below are directed to the remaining claims 1, 3-11, 13-21, 23-31, 33-41, 43-51, 53-61, 63-71, 73-81, 83-91, 93-101, 103-111 and 113-132.

4. Claims 1, 11, 21, 31, 41 and 51 were rejected under section 102 as being anticipated by Howell et al., U.S. Pat. No. 6,734,597 B1 ("Howell"). In response, these claims been amended to more clearly and more patentably distinguish the claimed invention over Howell. As a result, and for the reasons discussed below, it is believed this rejection is traversed.

Based on M.P.E.P. section 706.02, "for anticipation under 35 U.S.C. 102, the reference (Howell) must teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present".

In contrast, however, when these claims 1, 11, 21, 31, 41 and 51 are compared to Howell, substantial differences become apparent. This is explained below.

5. As noted above, claim 1 was rejected under section 102 as being anticipated by Howell. Claim 1 is copied below:

> *A thermal actuator (500) comprising:*
> *a substrate having a surface;*
> *a first support and a second support disposed on the surface and extending orthogonally therefrom;*
> *a beam (510) extending between the first support and the second support, the beam having a first side (511), a second side (512), a beam length (518) and a beam mid-point (519), the beam being substantially straight along the first side (511);*
> *the beam comprised of a plurality of beam segments (520, 522, 524), each beam segment of the plurality of beam segments having a beam segment*

width (525, 526, 527) orthogonal to the beam length, the beam thus forming a corresponding plurality of beam segment widths;

wherein the plurality of beam segment widths corresponding to the beam vary along the beam length based on a predetermined pattern;

so that a heating of the beam causes a beam buckling and the beam mid-point to translate in a predetermined direction (548) generally normal to and outward from the second side;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease,

claim 1, emphasis added.

Referring to Howell's Figures 1-2, there is depicted a plurality of beams 20 and 22. Each beam of the plurality of beams 20 and 22 comprises a uniform width and is substantially straight. Based on these two beam features of "uniform width" and "substantially straight", the depicted plurality of beams 20 and 22 DO NOT SATISFY ANY of the following two (2) limitations of claim 1:

"wherein the plurality of beam segment widths corresponding to the beam vary along the beam length based on a predetermined pattern",

claim 1, emphasis added ("the first claim 1 limitation");

and

"wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease",

claim 1, emphasis added ("the second claim 1 limitation").

Now referring to Howell's Figure 3, there is depicted a plurality of substantially straight, uniform-width beams 20. Based on these two beam features of "substantially straight" and "uniform width", the depicted plurality of beams 20 DO NOT SATISFY ANY of the first and second claim 1 limitations discussed above in connection with Figures 1-2.

Referring now to Howell's Figure 4, there is depicted three (3) beams, with each beam comprising three (3) beam elements 49, 48 and 49. As depicted in Figure 4, each beam's center beam element 48 may be characterized with respect to both of its two (2) adjacent end beam elements 49 by the following statements 1-2:

1. The center beam element 48 is WIDER than the end beam elements 49,

("the first Howell Figure 4 characterization");

And

2. The center beam element 48's upper and lower longitudinal edges are NON-CO-LINEAR, DISCONTINUOUS and NOT ALIGNED with any of the corresponding upper and lower longitudinal edges of the end beam elements 49,

("the second Howell Figure 4 characterization").

Based on these first and second Howell Figure 4 characterizations, Howell's Figure 4 beams DO NOT SATISFY the limitation *"the beam being substantially straight along the first side (511)"* of claim 1, emphasis added.

Now referring to Howell's Figure 5, there is depicted a first plurality of substantially straight, uniform-width beams 20 and a second plurality of substantially straight, uniform-width beams 22. Based on the beam features of "straight" and "uniform width", the depicted first and second pluralities of beams 20 and 22 DO NOT SATISFY ANY of the first and second claim 1 limitations discussed above in connection with Figures 1-2.

Referring now to Howell's Figure 6, there is depicted a first plurality of substantially straight, uniform-width beams 67a; a second plurality of substantially straight, uniform-width beams 68a; a third plurality of substantially straight, uniform-width beams 67b; a fourth plurality of substantially straight, uniform-width beams 68b; a fifth plurality of substantially straight, uniform-width beams 72a; and a sixth plurality of substantially straight, uniform-width beams 72b. Based on the foregoing beam features of "straight" and "uniform width", the depicted first, second, third, fourth, fifth and sixth pluralities of beams 67a, 68a, 67b, 68b, 72a and 72b DO NOT SATISFY ANY of the first and second claim 1 limitations discussed above in connection with Figures 1-2.

Now referring to Howell's Figure 7, there is depicted a first plurality of substantially straight, uniform-width beams 86a; a second plurality of substantially straight, uniform-width beams 86b; a third plurality of substantially straight, uniform-width beams 91a; a fourth plurality of substantially straight, uniform-width beams 91b; a fifth plurality of substantially straight, uniform-width beams 94a; and a sixth plurality of substantially straight, uniform-width beams 94b. Based on the foregoing beam features of "straight" and "uniform width", the depicted first, second, third, fourth, fifth and sixth pluralities of beams 86a, 86b, 91a, 91b, 94a and 94b DO NOT SATISFY ANY of the first and second claim 1 limitations discussed above in connection with Figures 1-2.

In summary, for the reasons above, Howell does NOT "teach every aspect of the claimed invention" in claim 1, as required by M.P.E.P. section 706.02 to support the rejection of anticipation. This rejection thus is traversed and claim 1 is allowable.

6. As for dependent claims 3-10, these claims are allowable as depending on their common parent claim 1 which, as explained in 5 above, is itself allowable.

7. As noted above, claim 11 was rejected as being anticipated by Howell. Claim 11 is copied below:

A thermal actuator (600) comprising:
a substrate having a surface;
a first support and a second support disposed on the surface and extending orthogonally therefrom;
a plurality of beams (610a, 610b, 610c) extending in parallel between the first support and the second support, thus forming a beam array (613);

each beam of the beam array having a first side (611a, 611b, 611c), a second side (612a, 612b, 612c), a beam length (618) and a beam mid-point (619), each beam being substantially straight along its first side (611a, 611b, 611c);

each beam of the beam array comprised of a plurality of beam segments (620, 622, 624), each beam segment of the plurality of beam segments having a beam segment width (625a, 626a, 627a, 625b, 626b, 627b, 625c, 627c, 627c) orthogonal to the beam length, each beam thus forming a corresponding plurality of beam segment widths;

wherein the plurality of beam segment widths corresponding to each beam vary along the beam length based on a predetermined pattern;

an included coupling beam (614) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point;

so that a heating of the beam array causes a beam array buckling and the coupling beam to translate in a predetermined direction (648) generally normal to and outward from the second sides of the array beams;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease,

claim 11, emphasis added.

Referring to Howell's Figures 1-2, there is depicted a plurality of beams 20 and 22, wherein each beam of the plurality of beams 20 and 22 comprises a uniform width and is substantially straight. Based on these two beam features of "uniform width" and "straight", the depicted plurality of beams 20 and 22 DO NOT SATISFY ANY of the following two (2) limitations of claim 11:

"wherein the plurality of beam segment widths corresponding to each beam vary along the beam length based on a predetermined pattern",

claim 11, emphasis added ("the first claim 11 limitation");

and

"wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease",

claim 11, emphasis added ("the second claim 11 limitation").

Now referring to Howell's Figure 3, there is depicted a plurality of substantially straight, uniform-width beams 20. Based on these two beam features of "straight" and "uniform width", the depicted plurality of beams 20 DO NOT SATISFY ANY of the first and second claim 11 limitations discussed above.

Further as to Figure 3, Howell's equivalent "beam array" depicted therein does NOT satisfy the further limitation *"an included coupling beam (614) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point"*, claim 11, emphasis added.

Referring now to Howell's Figure 4, based on the first and second Howell Figure 4 characterizations as described above in connection with claim 1, the depicted Figure 4 beams DO NOT SATISFY the limitation *"each beam being substantially straight along its first side (611a, 611b, 611c)"* of claim 11, emphasis added.

Further as to Figure 4, Howell's equivalent "beam array" depicted therein does NOT satisfy the further limitation *"an included coupling beam (614) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point"*, claim 11, emphasis added.

Now referring to Howell's Figure 5, there is depicted a first plurality of substantially straight, uniform-width beams 20 and a second plurality of straight, uniform-width beams 22. Based on these beam features of "straight" and "uniform width", the depicted first and second pluralities of beams 20 and 22 DO NOT SATISFY ANY of the first and second claim 11 limitations discussed above in connection with Figures 1-2.

Referring now to Howell's Figure 6, there is depicted a first plurality of substantially straight, uniform-width beams 67a; a second plurality of substantially straight, uniform-width beams 68a; a third plurality of substantially straight, uniform-width beams 67b; a fourth plurality of substantially straight, uniform-width beams 68b; a fifth plurality of substantially straight, uniform-width beams 72a; and a sixth plurality of substantially straight, uniform-width beams 72b. Based on these beam features of "straight" and "uniform width", the depicted first, second, third, fourth, fifth and sixth pluralities of beams 67a, 68a, 67b, 68b, 72a and 72b DO NOT SATISFY ANY of the first and second claim 11 limitations discussed above in connection with Figures 1-2.

Now referring to Howell's Figure 7, there is depicted a first plurality of substantially straight, uniform-width beams 86a; a second plurality of substantially straight, uniform-width beams 86b; a third plurality of substantially straight, uniform-width beams 91a; a fourth plurality of substantially straight, uniform-width beams 91b; a fifth plurality of substantially straight, uniform-width beams 94a; and a sixth plurality of substantially straight, uniform-width beams 94b. Based on these beam features of "straight" and "uniform width", the depicted first, second, third, fourth, fifth and sixth pluralities of beams 86a, 86b, 91a, 91b, 94a and 94b DO NOT SATISFY ANY of the first and second claim 11 limitations discussed above in connection with Figures 1-2.

In summary, for the reasons above, Howell does NOT "teach every aspect of the claimed invention" in claim 11, as required to support the rejection of anticipation. The rejection thus is traversed and claim 11 is allowable.

8. As for dependent claims 13-20, these claims are allowable as depending on their common parent claim 11 which, as explained in 7 above, is itself allowable.

9. As noted above, claim 21 was rejected as being anticipated by Howell. Claim 21 is copied below:

A thermal actuator (700) comprising:
a substrate having a surface;
a first support and a second support disposed on the surface and extending orthogonally therefrom;
a beam (710) extending between the first support and the second support, the beam having a first side (711), a second side (712), a beam length (718) and

a beam mid-point (719), the beam being substantially straight along the second side (712);

the beam comprised of a plurality of beam segments, each beam segment of the plurality of beam segments having a beam segment width (725, 726, 727) orthogonal to the beam length, the beam thus forming a corresponding plurality of beam segment widths;

wherein the plurality of beam segment widths corresponding to the beam vary along the beam length based on a predetermined pattern;

so that a heating of the beam causes a beam buckling and the beam mid-point to translate in a predetermined direction (748) generally normal to and outward from the second side;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase,

claim 21, emphasis added.

Referring to Howell's Figures 1-2, there is depicted a plurality of beams 20 and 22, wherein each beam of the plurality of beams 20 and 22 comprises a uniform width and is substantially straight. Based on these beam features of "uniform width" and "straight", the depicted plurality of beams 20 and 22 DO NOT SATISFY ANY of the following two (2) limitations of claim 21:

"wherein the plurality of beam segment widths corresponding to the beam vary along the beam length based on a predetermined pattern",

claim 21, emphasis added ("the first claim 21 limitation");

and

"wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease, and along the beam length from the beam mid-point to the

second support, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase",

claim 21, emphasis added ("the second claim 21 limitation").

Now referring to Howell's Figure 3, there is depicted a plurality of substantially straight, uniform-width beams 20. Based on these beam features of "straight" and "uniform width", the depicted plurality of beams 20 DO NOT SATISFY ANY of the first and second claim 21 limitations discussed above in connection with Figures 1-2.

Referring now to Howell's Figure 4, based on the first and second Howell Figure 4 characterizations as described above in connection with claim 1, Howell's Figure 4 beams DO NOT SATISFY the limitation *"the beam being substantially straight along the second side (712)"* of claim 21, emphasis added.

Now referring to Howell's Figure 5, there is depicted a first plurality of substantially straight, uniform-width beams 20 and a second plurality of straight, uniform-width beams 22. Based on these beam features of "straight" and "uniform width", the depicted first and second pluralities of beams 20 and 22 DO NOT SATISFY ANY of the first and second claim 21 limitations discussed above in connection with Figures 1-2.

Referring now to Howell's Figure 6, there is depicted a first plurality of substantially straight, uniform-width beams 67a; a second plurality of substantially straight, uniform-width beams 68a; a third plurality of substantially straight, uniform-width beams 67b; a fourth plurality of substantially straight, uniform-width beams 68b; a fifth plurality of substantially straight, uniform-width beams 72a; and a sixth plurality of substantially straight, uniform-width beams 72b. Based on these beam features of "straight" and "uniform width", the depicted first, second, third, fourth, fifth and sixth pluralities of beams 67a, 68a, 67b, 68b, 72a and 72b DO NOT SATISFY ANY of the first and second claim 21 limitations discussed above in connection with Figures 1-2.

Now referring to Howell's Figure 7, there is depicted a first plurality of substantially straight, uniform-width beams 86a; a second plurality of substantially straight, uniform-width beams 86b; a third plurality of substantially straight, uniform-width beams 91a; a fourth plurality of substantially straight, uniform-width beams 91b;

a fifth plurality of substantially straight, uniform-width beams 94a; and a sixth plurality of substantially straight, uniform-width beams 94b. Based on these beam features of "straight" and "uniform width", the depicted first, second, third, fourth, fifth and sixth pluralities of beams 86a, 86b, 91a, 91b, 94a and 94b DO NOT SATISFY ANY of the first and second claim 21 limitations discussed above in connection with Figures 1-2.

In summary, for the reasons above, Howell does NOT "teach every aspect of the claimed invention" in claim 21, as required to support the rejection of anticipation. This rejection thus is traversed and claim 21 is allowable.

10. As for dependent claims 23-30, these claims are allowable as depending on their common parent claim 21 which, as explained in 9 above, is itself allowable.

11. As noted above, claim 31 was rejected as being anticipated by Howell. Claim 31 is copied below:

A thermal actuator (800) comprising:
a substrate having a surface;
a first support and a second support disposed on the surface and extending orthogonally therefrom;
a plurality of beams (810a, 810b, 810c) extending in parallel between the first support and the second support, thus forming a beam array (813);
each beam of the beam array having a first side (811a, 811b, 811c), a second side (812a, 812b, 812c), a beam length (818) and a beam mid-point (819), each beam being substantially straight along its second side (812a, 812b, 812c);
each beam of the beam array comprised of a plurality of beam segments (820, 822, 824), each beam segment of the plurality of beam segments having a beam segment width (825a, 826a, 827a, 825b, 826b, 827b, 825c, 826c, 827c) orthogonal to the beam length, each beam thus forming a corresponding plurality of beam segment widths;
wherein the plurality of beam segment widths corresponding to each beam vary along the beam length based on a predetermined pattern;
an included coupling beam (814) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point;
so that a heating of the beam array causes a beam array buckling and the coupling beam to translate in a predetermined direction (848) generally normal to and outward from the second sides of the array beams;
wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not increase and at least

sometimes decrease, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase,

claim 31, emphasis added.

Referring to Howell's Figures 1-2, there is depicted a plurality of beams 20 and 22, wherein each beam of the plurality of beams 20 and 22 comprises a uniform width and is substantially straight. Based on these beam features of "uniform width" and "straight, the depicted plurality of beams 20 and 22 DO NOT SATISFY ANY of the following two (2) limitations of claim 31:

"wherein the plurality of beam segment widths corresponding to each beam vary along the beam length based on a predetermined pattern",

claim 31, emphasis added ("the first claim 31 limitation");

and

"wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase",

claim 31, emphasis added ("the second claim 31 limitation").

Now referring to Howell's Figure 3, there is depicted a plurality of substantially straight, uniform-width beams 20. Based on these beam features of "straight" and "uniform width", the depicted plurality of beams 20 DO NOT SATISFY ANY of the first and second claim 31 limitations discussed above in connection with Figures 1-2.

Further as to Figure 3, Howell's equivalent "beam array" depicted therein does NOT satisfy the further limitation *"an included coupling beam (814) extending*

orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point", claim 31, emphasis added.

Referring now to Howell's Figure 4, based on the first and second Howell Figure 4 characterizations as described above in connection with claim 1, Howell's Figure 4 beams DO NOT SATISFY the limitation *"each beam being substantially straight along its second side (812a, 812b, 812c)"* of claim 31, emphasis added.

Further as to Figure 4, Howell's equivalent "beam array" depicted therein does NOT satisfy the further limitation *"an included coupling beam (814) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point"*, claim 31, emphasis added.

Now referring to Howell's Figure 5, there is depicted a first plurality of substantially straight, uniform-width beams 20 and a second plurality of straight, uniform-width beams 22. Based on these beam features of "straight" and "uniform width", the depicted first and second pluralities of beams 20 and 22 DO NOT SATISFY ANY of the first and second claim 31 limitations discussed above in connection with Figures 1-2.

Referring now to Howell's Figure 6, there is depicted a first plurality of substantially straight, uniform-width beams 67a; a second plurality of substantially straight, uniform-width beams 68a; a third plurality of substantially straight, uniform-width beams 67b; a fourth plurality of substantially straight, uniform-width beams 68b; a fifth plurality of substantially straight, uniform-width beams 72a; and a sixth plurality of substantially straight, uniform-width beams 72b. Based on these beam features of "straight" and "uniform width", the depicted first, second, third, fourth, fifth and sixth pluralities of beams 67a, 68a, 67b, 68b, 72a and 72b DO NOT SATISFY ANY of the first and second claim 31 limitations discussed above in connection with Figures 1-2.

Now referring to Howell's Figure 7, there is depicted a first plurality of substantially straight, uniform-width beams 86a; a second plurality of substantially straight, uniform-width beams 86b; a third plurality of substantially straight, uniform-width beams 91a; a fourth plurality of substantially straight, uniform-width beams 91b; a fifth plurality of substantially straight, uniform-width beams 94a; and a sixth plurality of substantially straight, uniform-width beams 94b. Based on these beam features of

"straight" and "uniform width", the depicted first, second, third, fourth, fifth and sixth pluralities of beams 86a, 86b, 91a, 91b, 94a and 94b DO NOT SATISFY ANY of the first and second claim 31 limitations discussed above in connection with Figures 1-2.

In summary, for the reasons above, Howell does NOT "teach every aspect of the claimed invention" in claim 31, as required to support the rejection of anticipation. This rejection thus is traversed and claim 31 is allowable.

12. As for dependent claims 33-40, these claims are allowable as depending on their common parent claim 31 which, as explained in 11 above, is itself allowable.

13. As noted above, claim 41 was rejected as being anticipated by Howell. Claim 41 is copied below:

> *A thermal actuator (900) comprising:*
> *a substrate having a surface;*
> *a first support and a second support disposed on the surface and extending orthogonally therefrom;*
> *a beam (910) extending between the first support and the second support, the beam having a first side (911), a second side (912), a beam length (918) and a beam mid-point (919), the beam being substantially straight along the first side (911);*
> *the beam comprised of a plurality of beam segments (920, 921, 922, 923, 924), each beam segment of the plurality of beam segments having a beam segment average width (925, 931, 926, 933, 927) orthogonal to the beam length, the beam thus forming a corresponding plurality of beam segment average widths;*
> *wherein the plurality of beam segment average widths corresponding to the beam vary along the beam length based on a predetermined pattern;*
> *so that a heating of the beam causes a beam buckling and the beam mid-point to translate in a predetermined direction (948) generally normal to and outward from the second side;*
> *wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment average widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment average widths corresponding to successive beam segments do not increase and at least sometimes decrease,*

claim 41, emphasis added.

Referring to Howell's Figures 1-2, there is depicted a plurality of beams 20 and 22, wherein each beam of the plurality of beams 20 and 22 comprises a uniform width and is substantially straight. Based on these beam features of "uniform width" and "straight", the depicted plurality of beams 20 and 22 DO NOT SATISFY ANY of the following two (2) limitations of claim 41:

> *"wherein the plurality of beam segment average widths corresponding to the beam vary along the beam length based on a predetermined pattern",*
> claim 41, emphasis added ("the first claim 41 limitation");

and

> *"wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment average widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment average widths corresponding to successive beam segments do not increase and at least sometimes decrease",*
> claim 41, emphasis added ("the second claim 41 limitation").

Now referring to Howell's Figure 3, there is depicted a plurality of substantially straight, uniform-width beams 20. Based on these beam features of "straight" and "uniform width", the depicted plurality of beams 20 DO NOT SATISFY ANY of the first and second claim 41 limitations discussed above in connection with Figures 1-2.

Referring now to Howell's Figure 4, based on the first and second Howell Figure 4 characterizations as described above in connection with claim 1, Howell's Figure 4 beams DO NOT SATISFY the limitation *"the beam being substantially straight along the first side (911)"* of claim 41, emphasis added.

Now referring to Howell's Figure 5, there is depicted a first plurality of substantially straight, uniform-width beams 20 and a second plurality of straight, uniform-width beams 22. Based on these beam features of "straight" and "uniform

width", the depicted first and second pluralities of beams 20 and 22 DO NOT SATISFY ANY of the first and second claim 41 limitations discussed above in connection with Figures 1-2.

Referring now to Howell's Figure 6, there is depicted a first plurality of substantially straight, uniform-width beams 67a; a second plurality of substantially straight, uniform-width beams 68a; a third plurality of substantially straight, uniform-width beams 67b; a fourth plurality of substantially straight, uniform-width beams 68b; a fifth plurality of substantially straight, uniform-width beams 72a; and a sixth plurality of substantially straight, uniform-width beams 72b. Based on these beam features of "straight" and "uniform width", the depicted first, second, third, fourth, fifth and sixth pluralities of beams 67a, 68a, 67b, 68b, 72a and 72b DO NOT SATISFY ANY of the first and second claim 41 limitations discussed above in connection with Figures 1-2.

Now referring to Howell's Figure 7, there is depicted a first plurality of substantially straight, uniform-width beams 86a; a second plurality of substantially straight, uniform-width beams 86b; a third plurality of substantially straight, uniform-width beams 91a; a fourth plurality of substantially straight, uniform-width beams 91b; a fifth plurality of substantially straight, uniform-width beams 94a; and a sixth plurality of substantially straight, uniform-width beams 94b. Based on these beam features of "straight" and "uniform width", the depicted first, second, third, fourth, fifth and sixth pluralities of beams 86a, 86b, 91a, 91b, 94a and 94b DO NOT SATISFY ANY of the first and second claim 41 limitations discussed above in connection with Figures 1-2.

In summary, for the reasons above, Howell does NOT "teach every aspect of the claimed invention" in claim 41, as required to support the rejection of anticipation. This rejection thus is traversed and claim 41 is allowable.

14. As for dependent claims 43-50, these claims are allowable as depending on their common parent claim 41 which, as explained in 13 above, is itself allowable.

15. As noted above, claim 51 was rejected as being anticipated by Howell. Claim 51 is copied below:

A thermal actuator (1000) comprising:

a substrate having a surface;

a first support and a second support disposed on the surface and extending orthogonally therefrom;

a plurality of beams (1010a, 1010b, 1010c) extending in parallel between the first support and the second support, thus forming a beam array (1009); each beam of the beam array having a first side (1011a, 1011b, 1011c), a second side (1012a, 1012b, 1012c), a beam length (1018) and a beam mid-point (1019), each beam being substantially straight along its first side (1011a, 1011b, 1011c);

each beam of the beam array comprised of a plurality of beam segments (1020, 1021, 1022, 1023, 1024), each beam segment of the plurality of beam segments having a beam segment average width (1025a, 1031a, 1026a, 1033a, 1027a, 1025b, 1031b, 1026b, 1033b, 1027b, 1025c, 1031c, 1026c, 1033c, 1027c) orthogonal to the beam length, each beam thus forming a corresponding plurality of beam segment average widths;

wherein the plurality of beam segment average widths corresponding to each beam vary along the beam length based on a predetermined pattern;

an included coupling beam (1005) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point;

so that a heating of the beam array causes a beam array buckling and the coupling beam to translate in a predetermined direction (1048) generally normal to and outward from the second sides of the array beams;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment average widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease,

claim 51, emphasis added.

Referring to Howell's Figures 1-2, there is depicted a plurality of beams 20 and 22, wherein each beam of the plurality of beams 20 and 22 comprises a uniform width and is substantially straight. Based on these beam features of "uniform width" and "straight", the depicted plurality of beams 20 and 22 DO NOT SATISFY ANY of the following two (2) limitations of claim 51:

"wherein the plurality of beam segment average widths corresponding to each beam vary along the beam length based on a predetermined pattern",

claim 51, emphasis added ("the first claim 51 limitation");

and

"wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment average widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment average widths corresponding to successive beam segments do not increase and at least sometimes decrease",
claim 51, emphasis added ("the second claim 51 limitation").

Now referring to Howell's Figure 3, there is depicted a plurality of substantially straight, uniform-width beams 20. Based on these beam features of "straight" and "uniform width", the depicted plurality of beams 20 DOES NOT SATISFY ANY of the first and second claim 51 limitations discussed above in connection with Figures 1-2.

Further as to Figure 3, Howell's equivalent "beam array" depicted therein does NOT satisfy the further limitation *"an included coupling beam (1005) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point"*, claim 51, emphasis added.

Referring now to Howell's Figure 4, based on the first and second Howell Figure 4 characterizations as described above in connection with claim 1, Howell's Figure 4 beams DO NOT SATISFY the limitation *"each beam being substantially straight along its first side (1011a, 1011b, 1011c)"* of claim 51, emphasis added.

Further as to Figure 4, Howell's equivalent "beam array" depicted therein does NOT satisfy the further limitation *"an included coupling beam (1005) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point"*, claim 51, emphasis added.

Now referring to Howell's Figure 5, there is depicted a first plurality of substantially straight, uniform-width beams 20 and a second plurality of straight, uniform-width beams 22. Based on these beam features of "straight" and "uniform width", the depicted first and second pluralities of beams 20 and 22 DO NOT SATISFY

ANY of the first and second claim 51 limitations discussed above in connection with Figures 1-2.

Referring now to Howell's Figure 6, there is depicted a first plurality of substantially straight, uniform-width beams 67a; a second plurality of substantially straight, uniform-width beams 68a; a third plurality of substantially straight, uniform-width beams 67b; a fourth plurality of substantially straight, uniform-width beams 68b; a fifth plurality of substantially straight, uniform-width beams 72a; and a sixth plurality of substantially straight, uniform-width beams 72b. Based on these beam features of "straight" and "uniform width", the depicted first, second, third, fourth, fifth and sixth pluralities of beams 67a, 68a, 67b, 68b, 72a and 72b DO NOT SATISFY ANY of the first and second claim 51 limitations discussed above in connection with Figures 1-2.

Now referring to Howell's Figure 7, there is depicted a first plurality of substantially straight, uniform-width beams 86a; a second plurality of substantially straight, uniform-width beams 86b; a third plurality of substantially straight, uniform-width beams 91a; a fourth plurality of substantially straight, uniform-width beams 91b; a fifth plurality of substantially straight, uniform-width beams 94a; and a sixth plurality of substantially straight, uniform-width beams 94b. Based on these beam features of "straight" and "uniform width", the depicted first, second, third, fourth, fifth and sixth pluralities of beams 86a, 86b, 91a, 91b, 94a and 94b DO NOT SATISFY ANY of the first and second claim 51 limitations discussed above in connection with Figures 1-2.

In summary, for the reasons above, Howell does NOT "teach every aspect of the claimed invention" in claim 51, as required to support the rejection of anticipation. This rejection thus is traversed and claim 51 is allowable.

16. As for dependent claims 53-60, these claims are allowable as depending on their common parent claim 51 which, as explained in 15 above, is itself allowable.

17. Claims 61, 71, 81, 91, 101 and 111 were rejected under section 103 as being unpatentable over the combination of Howell; Maluf et al., US 2002/0174891 A1 ("Maluf"); and Cochran, US Pat. No. 6,853,765 B1. In response, these claims have been amended to more clearly and more patentably distinguish the claimed invention

over these references. As a result, and for the reasons discussed below, it is believed this rejection is traversed.

18. As for claim 61, this claim includes the same limitations as claim 1. As to claim 1, this claim is allowable under section 102 over Howell since Howell does not satisfy those limitations of claim 1 that are identified and discussed in 5 above, such limitations hereinafter being referred to as "Howell's unsatisfied claim 1 limitations".

As to claim 61, while this claim is not rejected under section 102 over Howell, claim 61 yet is allowable under section 102 over Howell. This is because Howell does not satisfy the same limitations in claim 61 that are identified and discussed in 5 above with respect to claim 1, namely, Howell's unsatisfied claim 1 limitations.

Moreover, claim 61 also is allowable under section 103 over the combination of Howell, Maluf and Cochran. This is because the combination of these 3 references still does not satisfy the same limitations in claim 61 that are identified and discussed in 5 above with respect to claim 1, namely, Howell's unsatisfied claim 1 limitations.

Thus, when the invention of claim 61 is compared with the references Howell, Maluf and Cochran, distinct differences become apparent. But unless these references, by themselves, would have suggested not only these differences but the entire invention of claim 61, viewed as a whole, to one of ordinary skill in the art at the time the invention was made, the invention of claim 61 is not unpatentable under section 103. This rejection thus is traversed and claim 61 is allowable.

19. As for dependent claims 63-70, these claims are allowable as depending on their common parent claim 61 which, as explained in 18 above, is itself allowable.

20. As for claim 71, this claim includes the same limitations as claim 11. As to claim 11, this claim is allowable under section 102 over Howell since Howell does not satisfy those limitations of claim 11 that are identified and discussed in 7 above, such limitations hereinafter being referred to as "Howell's unsatisfied claim 11 limitations".

As to claim 71, while this claim is not rejected under section 102 over Howell, claim 71 yet is allowable under section 102 over Howell. This is because Howell does

not satisfy the same limitations in claim 71 that are identified and discussed in 7 above with respect to claim 11, namely, Howell's unsatisfied claim 11 limitations.

Moreover, claim 71 also is allowable under section 103 over the combination of Howell, Maluf and Cochran. This is because the combination of these 3 references still does not satisfy the same limitations in claim 71 that are identified and discussed in 7 above with respect to claim 11, namely, Howell's unsatisfied claim 11 limitations.

Thus, when the invention of claim 71 is compared with the references Howell, Maluf and Cochran, distinct differences become apparent. But unless these references, by themselves, would have suggested not only these differences but the entire invention of claim 71, viewed as a whole, to one of ordinary skill in the art at the time the invention was made, the invention of claim 71 is not unpatentable under section 103. This rejection thus is traversed and claim 71 is allowable.

21. As for dependent claims 73-80, these claims are allowable as depending on their common parent claim 71 which, as explained in 20 above, is itself allowable.

22. As for claim 81, this claim includes the same limitations as claim 21. As to claim 21, this claim is allowable under section 102 over Howell since Howell does not satisfy those limitations of claim 21 that are identified and discussed in 9 above, such limitations hereinafter being referred to as "Howell's unsatisfied claim 21 limitations".

As to claim 81, while this claim is not rejected under section 102 over Howell, claim 81 yet is allowable under section 102 over Howell. This is because Howell does not satisfy the same limitations in claim 81 that are identified and discussed in 9 above with respect to claim 21, namely, Howell's unsatisfied claim 21 limitations.

Moreover, claim 81 also is allowable under section 103 over the combination of Howell, Maluf and Cochran. This is because the combination of these 3 references still does not satisfy the same limitations in claim 81 that are identified and discussed in 9 above with respect to claim 21, namely, Howell's unsatisfied claim 21 limitations.

Thus, when the invention of claim 81 is compared with the references Howell, Maluf and Cochran, distinct differences become apparent. But unless these references, by themselves, would have suggested not only these differences but the

entire invention of claim 81, viewed as a whole, to one of ordinary skill in the art at the time the invention was made, the invention of claim 81 is not unpatentable under section 103. This rejection thus is traversed and claim 81 is allowable.

23. As for dependent claims 83-90, these claims are allowable as depending on their common parent claim 81 which, as explained in 22 above, is itself allowable.

24. As for claim 91, this claim includes the same limitations as claim 31. As to claim 31, this claim is allowable under section 102 over Howell since Howell does not satisfy those limitations of claim 31 that are identified and discussed in 11 above, such limitations hereinafter being referred to as "Howell's unsatisfied claim 31 limitations".

As to claim 91, while this claim is not rejected under section 102 over Howell, claim 91 yet is allowable under section 102 over Howell. This is because Howell does not satisfy the same limitations in claim 91 that are identified and discussed in 11 above with respect to claim 31, namely, Howell's unsatisfied claim 31 limitations.

Moreover, claim 91 also is allowable under section 103 over the combination of Howell, Maluf and Cochran. This is because the combination of these 3 references still does not satisfy the same limitations in claim 91 that are identified and discussed in 11 above with respect to claim 31, namely, Howell's unsatisfied claim 31 limitations.

Thus, when the invention of claim 91 is compared with the references Howell, Maluf and Cochran, distinct differences become apparent. But unless these references, by themselves, would have suggested not only these differences but the entire invention of claim 91, viewed as a whole, to one of ordinary skill in the art at the time the invention was made, the invention of claim 91 is not unpatentable under section 103. This rejection thus is traversed and claim 91 is allowable.

25. As for dependent claims 93-100, these claims are allowable as depending on their common parent claim 91 which, as explained in 24 above, is itself allowable.

26. As for claim 101, this claim includes the same limitations as claim 41. As to claim 41, this claim is allowable under section 102 over Howell since Howell does not

satisfy those limitations of claim 41 that are identified and discussed in 13 above, such limitations hereinafter being referred to as "Howell's unsatisfied claim 41 limitations".

As to claim 101, while this claim is not rejected under section 102 over Howell, claim 101 yet is allowable under section 102 over Howell. This is because Howell does not satisfy the same limitations in claim 101 that are identified and discussed in 13 above with respect to claim 41, namely, Howell's unsatisfied claim 41 limitations.

Moreover, claim 101 also is allowable under section 103 over the combination of Howell, Maluf and Cochran. This is because the combination of these 3 references still does not satisfy the same limitations in claim 101 that are identified and discussed in 13 above with respect to claim 41, namely, Howell's unsatisfied claim 41 limitations.

Thus, when the invention of claim 101 is compared with the references Howell, Maluf and Cochran, distinct differences become apparent. But unless these references, by themselves, would have suggested not only these differences but the entire invention of claim 101, viewed as a whole, to one of ordinary skill in the art at the time the invention was made, the invention of claim 101 is not unpatentable under section 103. This rejection thus is traversed and claim 101 is allowable.

27. As for dependent claims 103-110, these claims are allowable as depending on their common parent claim 101 which, as explained in 26 above, is itself allowable.

28. As for claim 111, this claim includes the same limitations as claim 51. As to claim 51, this claim is allowable under section 102 over Howell since Howell does not satisfy those limitations of claim 51 that are identified and discussed in 15 above, such limitations hereinafter being referred to as "Howell's unsatisfied claim 51 limitations".

As to claim 111, while this claim is not rejected under section 102 over Howell, claim 111 yet is allowable under section 102 over Howell. This is because Howell does not satisfy the same limitations in claim 111 that are identified and discussed in 15 above with respect to claim 51, namely, Howell's unsatisfied claim 51 limitations.

Moreover, claim 111 also is allowable under section 103 over the combination of Howell, Maluf and Cochran. This is because the combination of these 3 references still

does not satisfy the same limitations in claim 111 that are identified and discussed in 15 above with respect to claim 51, namely, Howell's unsatisfied claim 51 limitations.

Thus, when the invention of claim 111 is compared with the references Howell, Maluf and Cochran, distinct differences become apparent. But unless these references, by themselves, would have suggested not only these differences but the entire invention of claim 111, viewed as a whole, to one of ordinary skill in the art at the time the invention was made, the invention of claim 111 is not unpatentable under section 103. This rejection thus is traversed and claim 111 is allowable.

29. As for dependent claims 113-120, these claims are allowable as depending on their common parent claim 111 which, as explained in 28 above, is itself allowable.

30. As for dependent claims 121-122, these claims are allowable as depending on their common parent claim 11 which, as explained in 7 above, is itself allowable.

31. As for dependent claims 123-124, these claims are allowable as depending on their common parent claim 31 which, as explained in 11 above, is itself allowable.

32. As for dependent claims 125-126, these claims are allowable as depending on their common parent claim 51 which, as explained in 15 above, is itself allowable.

33. As for dependent claims 127-128, these claims are allowable as depending on their common parent claim 71 which, as explained in 20 above, is itself allowable.

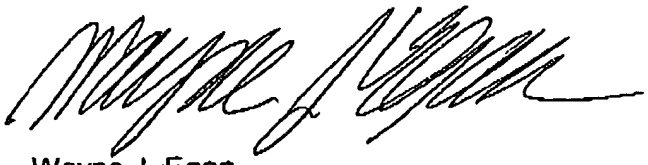
34. As for dependent claims 129-130, these claims are allowable as depending on their common parent claim 91 which, as explained in 24 above, is itself allowable.

35. As for dependent claims 131-132, these claims are allowable as depending on their common parent claim 111 which, as explained in 28 above, is itself allowable.

In summary, it is believed the remaining claims are allowable and the application is in condition for allowance. Further consideration of this application is respectfully requested.

Any inquiry concerning this communication should be directed to the undersigned attorney at the phone numbers shown below.

Respectfully submitted,



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